# Corruption and Hold-up: the role of intermediaries*

Ajit Mishra† and Andrew Samuel‡

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**Abstract**

Corrupt contracts are illegal and, therefore, vulnerable to hold-up. That is, a bureaucrat who has accepted a bribe from a firm in exchange for a license may still choose not to grant the firm that license (hold-up). This paper studies the role that intermediaries play in facilitating bribery by preventing such hold-up. There are two types of firms, good firms that are legally entitled to receive a license, and harmful firms that are not. In the absence of any intermediaries, because of the hold-up possibilities, only good firms enter the market, and harmful firms do not. Intermediaries help firms reduce their navigation costs of obtaining licenses, and thereby increase participation by good firms. However, intermediaries can also use the legal aspects of their transaction with good firms as leverage against the bureaucrat in order to prevent hold-up among harmful firms. Thus, intermediaries increase participation by both good and harmful firms and their welfare costs are ambiguous.

JEL: D21, K42

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# 1 Introduction

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†Department of Economics, University of Bath, BA2 7AY, United Kingdom. Email: A.Mishra@bath.ac.uk

‡Department of Economics, Loyola University, Baltimore, MD 21210, U.S.A. Email: asamuel@loyola.edu

Corrupt contracts are not enforceable in a court of law and are therefore vulnerable to "hold-up". That is, a bureaucrat who has accepted a bribe from a firm in exchange for issuing a license or a permit may still choose not to grant the firm that license. In order to avoid this problem firms frequently employ middlemen or intermediaries to facilitate corrupt transactions. Thus, it has been argued that eliminating these intermediaries may make corruption more difficult, thereby reducing bribery (see Lambsdorff [2011] for a discussion of this issue). This argument ignores the fact the intermediaries provide many legal services to firms. A recent OECD study on the role of intermediaries in bribery asserts that "intermediaries provide many legitimate services to firms" despite the fact that they also "engage in bribing foreign officials" (OECD 2009). For example, because of their experience, intermediaries may be able to legally lower the firm's navigation cost of obtaining a permit. Indeed, the Foreign Corruption Practices Act of the U.S. acknowledges this by allowing firms to make "facilitating payments for routine governmental action", including for issuing licenses, "that are already required by law" (O'Melveny 2009). However, intermediaries may also be able to facilitate the bribing of officials (and prevent hold-up) in order to obtain a business permit even when it is illegal to grant the firm such a permit. Indeed, as Lambsdorff and Teksoz (2005) state,

> a purely corrupt relationship is a rare thing. Corrupt deals are commonly embedded in more complex relationships between different actors. More often than not these relationships also entail a variety of legal transactions.

Other empirical studies of bribery also find that intermediaries are employed to conduct both legal and illegal services, sometimes for the same client and at other times for different clients. Bjorvatn, Torsvik, and Tungodden (2005), in their study of corruption in Tanzania, find that former bureaucrats, who were fired during an anti-corruption operation, become intermediaries. These former bureaucrats use their former contacts to foster corrupt transactions. In a recent "audit study" of procuring drivers licenses in New Delhi, India, Bertrand et al. (2007) find that applicants often employ the services of intermediaries in order to obtain their license. In this context, intermediaries are employed to speed-up the processing time for a license, and enable their clients to procure a license even without taking the driving test. Although their study does not have any direct evidence of bribery, it suggests that a significant fraction of the fees that clients pay intermediaries is passed on the bureaucrat in the form of a bribe. Furthermore, based on the results of a subsequent driving test, they find that both "good" drivers (who should receive a license) and "poor" drivers (who should not),

employ intermediaries in order to procure their license. Oldenburg (1987) similarly discusses the role of intermediaries in facilitating bribe payments in a land consolidation program for farmers in India. He finds that intermediaries are often used to pass on bribes to bureaucrats from their clients. He observes that these bribes are sometimes paid to "speed-up" perfectly legal land consolidation applications, while in other cases intermediaries are employed to facilitate improper or illegal land consolidation requests. Indeed, he states that the "overall transaction is proper even though the sub-transactions are corrupt."

In this paper we argue that the legal-illegal combination of the services that intermediaries provide is a critical element of the mechanism that intermediaries employ to prevent "hold-up". We develop a model to show that intermediaries are able to prevent corrupt contracts from being vulnerable to hold-up because they embed corrupt contracts within more complex, partially legal, contracts. Thus, as Lambsdorff (2002) notes, many corrupt contracts occur in the "shadow of the law" where "the legal transaction acts as a guarantor of the corrupt deal" (Lambsdorff, 2005). Specifically, in our model intermediaries legally reduce the navigation costs of seeking permits or licenses for firms. Hence intermediaries facilitate delivery of permits to firms that are legally entitled to receive this permit. However, they also attempt to obtain permits for firms that are not legally entitled to receive such permits. We show that intermediaries can exploit this combination of legitimate and illegitimate services to enforce occasional (i.e. one-shot) bribe contracts even in the presence of hold-up (and without resorting to infinitely repeated play or reputations).

To understand our intuition more clearly, consider a model with two types of firms: some that are legally eligible to apply for a license and others that are not. Both types of firms are subject to navigation costs that can be reduced by hiring the intermediary. A corruptible bureaucrat issues permits buts incurs some positive cost in doing so. The bureaucrat can withhold a permit from an eligible firm unless it is paid a bribe (extortion) or grant a license to an ineligible firm in exchange for a bribe (bribery). Both types of firms are subject to hold-up by the bureaucrat. Since we study a single period scenario, reputational concerns or other "repeated game enforcement mechanisms" cannot enforce the bribe contract, therefore, hold-up by the bureaucrat is credible. However, the institutional setting allows firms, whether eligible or ineligible, to appeal (at some cost) to a higher authority (or court) to request a license if their application was previously denied. Because of the existence of the appeals

process, eligible firms are not subject to any hold-up.[1] However, since appeals are costly, these firms do pay a positive bribe to receive the permit. The ineligible firm, on the other hand, does not benefit from the appeals process and, therefore, is likely to be held-up by the bureaucrat after paying any bribe.

The solution to the hold-up problem is based on two key attributes associated with the presence of an intermediary. First, the intermediary enjoys substantial economies of scale in court costs so that once it goes to court, the costs of any future litigations are much lower. Second, an intermediary can engage in collective bribe negotiation with the bureaucrat so that if the bureaucrat fails to deliver the permit for a single firm, the intermediary can renegotiate the bribe amount for the remaining client firms. Specifically, suppose an intermediary has both eligible and ineligible firms as its clients and negotiates a bribe amount with the bureaucrat for a certain number of permits. The intermediary first charges each firm an up-front fee. It then processes the applications of the ineligible firms followed by the those of the eligible firms (the latter acting as the carrot). In the event of hold-up (for any ineligible firm), the intermediary can approach the court in order to prove that it made an honest effort to procure a license on behalf of the firm, thereby, avoiding any loss of reputation. This decision to go to court triggers a renegotiation of the bribe which the intermediary has to pay the bureaucrat for the (remaining) eligible firms. Since the bribe amount depends on the court costs and costs exhibit returns to scale, this renegotiated bribe is lower following any incident of hold-up.[2] Thus, if the expected reduction in the future bribe from the intermediary is greater than its benefit from hold-up, the bureaucrat will not hold-up the licenses of any ineligible firms. Further, the intermediary is never held-up for any eligible firm as it can always approach the court to appeal against the non-issuance of permits.

After studying the conditions under which the above mechanism can prevent hold-up, we also study the welfare implications of intermediaries. We show that in the absence of

[1] Our use of the term "hold-up" should be distinguished from Lambert - Mogiliansky, Majumder, and Radner (2007) and Choi and Thum (2004). These papers refer to "hold-up" as the practice (by bureaucrats) of denying licenses to firms that are legally entitled to receive those licenses unless they are paid a bribe. In contrast, we identify this behavior as extortion and refer to hold-up as the practice of denying firms licenses to firms after they have paid a bribe, and irrespective of whether they are legally entitled to receive the license or not.

[2] Note that the intermediary will approach the court irrespective of whether the denied firm is eligible or ineligible. Failure to do so damages its reputation. We can relax this assumption and generate committment through contractual means, as done in an earlier version. We thank a referee for the current interpretation.

intermediaries only a subset of legally eligible firms receive licenses, and that hold-up prevents ineligible firms from entering the market. In the presence of intermediaries the navigation costs for firms are lowered. As a result, more eligible firms enter the market. However, since intermediaries also provide services to illegal firms and enable them to "solve" the hold-up problem, the number of illegal firms also increases in the presence of intermediaries. Hence, the number of firms of both types increases in the presence of intermediaries, and to the extent the presence of ineligible firms is welfare reducing, there is a trade-off to eliminating intermediaries altogether.

Although, to our knowledge, ours is the first model to consider this mechanism using legal-illegal interface, there is a sizeable literature on the type of bureaucratic corruption that is studied in this paper.[3] The majority of these papers study the policy implications of bribery and do not explicitly model the transaction process of bribe contracts or the means by which they are enforced. More recent papers attempt to bridge this gap in the literature by studying the role of intermediaries. Bayar (2005), and similarly Bose and Gangopadhyay (2009), examine the role of intermediaries in a model where some bureaucrats are corrupt and others honest and where the identity of these corrupt bureaucrats is known only to the intermediary (and not the firm). Firms that approach corrupt bureaucrats directly may illegally receive a permit in exchange for a bribe, whereas firms that approach honest bureaucrats are punished for attempted bribery. Thus, because of their knowledge regarding the identity of bureaucrats, intermediaries lower the cost of bribery and are able to facilitate corrupt transactions even in situations where most bureaucrats are honest. Although their paper focuses on the "informational" role of intermediaries it does not examine the role that intermediaries may play in preventing "hold-up". Hasker and Okten (2008) similarly study the role of intermediaries in a model where firms may bribe bureaucrats directly, or through an intermediary. Firms are subject to hold-up, but because of their repeated interaction with bureaucrats, intermediaries are not subject to hold-up. In this context intermediaries worsen the impact of corruption because they facilitate bribery even in situations where the presence of hold-up would have otherwise prevented bribery from occurring.[4]

[3]See Mookherjee and Png (1995), Mishra (2008), and Samuel (2009) and the references therein for a review of this literature.

[4]Other reasons for intermediaries have been proposed. Drugov et. al. (2011) find experimental evidence to support the hypothesis that intermediaries are used to lower the moral costs involved with corruption transactions. See Coffman (2011) for related study on intermediation and its impact on incentives.

Although Hasker and Okten (2008) do not explicitly model the repeated-game between the intermediary and the bureaucrat, it is clear that intermediaries who repeatedly interact with bureaucrats can use trigger strategies to guarantee that the bureaucrat does not renege on the bribe contract. Dechenaux and Samuel (2011) study the role of repeated play, while Besley and McLaren (1993), Carillo (2000), and Tirole (1992) study the role of reputation in enforcing bribe contracts in the presence of hold-up. These papers show that in settings with repeated interactions, bribery can be sustained despite the possibility of hold-up.

However, it may not always be possible for an intermediary to repeatedly interact with the same bureaucrat, and there are many instances in which one-shot (or occasional) bribe contracts do occur despite the potential for hold-up. In the absence of repeated interactions bribery may be sustained if the participants in the corrupt transaction can post hostages, as discussed in the literature on incomplete contracts (Williamson 1983). Buccirossi and Spagnolo (2006) and Lambsdorff and Nell (2007) show that leniency policies towards whistle-blowers can enforce bribe transactions in the presence of hold-up. That is, by obtaining hard evidence about the bribe transaction, the party vulnerable to hold-up can use it as a "hostage" and threaten to expose the illegal transaction (without fearing punishment themselves) if they are held-up. Thus, these papers show that a poorly designed leniency policy can sustain bribery even in the presence of hold-up.

Our paper is related to these papers in that we study bribery in the presence of hold-up without relying on repeated play to enforce the bribe contract. However, instead of studying hostage mechanisms we show that bribery can be sustained when the intermediary provides both legitimate and illegitimate services to firms. In contrast to our paper, Buccirossi and Spagnolo (2006) assume that only firms that are not eligible for a permit pay a bribe. In our model both eligible and ineligible firms have to pay bribes to obtain a license. Thus, bribery is not necessarily welfare reducing because it may increase the number of eligible firms.

Following the introduction, the second section presents the benchmark model and derives the equilibrium without intermediaries, the third extends the benchmark model to include intermediaries. The fourth section considers various extensions and policy implications, and provides a welfare analysis of the presence of intermediaries. The welfare implications of eliminating intermediation are ambiguous and depend on various factors such as navigation costs, court costs, degree of red tape. The final section concludes.

# 2 The model

Consider a model with three risk-neutral players firms, a monopolistic intermediary who plays the role of a middleman, and a bureaucrat. Firms are of two types $i = \{g, h\}$, where $g$ refers to the good or eligible type and $h$ refers to the harmful type (that is ineligible for the license). There are total of $n_g$ and $n_h$ potential number of $g$ and $h$ type firms respectively, where $n_{i=\{g,h\}}$ is a positive integer. Each firm receives a private value of $v$ if it is granted a license by a bureaucrat where $v \sim U[\underline{v}, \overline{v}]$, with $\underline{v} \geq 0$, and $v$ independent of $\{g, h\}$. With slight abuse of notation we denote harm generated by the harmful types by $h$, where $h > 0$ is sufficiently large (relative to the distribution of $v$) so that all $h$ type firms are welfare reducing if they are granted a license.

The cost of obtaining the license (in order to realize the benefit $v$) is 0, however, procuring the license involves some additional navigation costs $\gamma > 0$. Bureaucrats hired by the government are paid a fixed wage, not related to issuance of licenses. The cost to the bureaucrat of processing a license from either type of firm is $e > 0$. Bureaucrats do not receive any additional incentive payments for issuing licenses. We assume that both the type of the firm and the firm's $v$ are observable by the bureaucrat.[5] Bureaucrats are corruptible and attempt to extort payments from $g$ types and bribes from $h$ types. Distinguishing between these two forms of bribery is important because licenses should be issued to all $g$ types and to none of the $h$ types.[6]

Turning now to the institutional framework, there is a court (or some higher authority) that can be used to appeal the bureaucrat's decision. Specifically, if a firm's license application is rejected by a bureaucrat, the firm (or an intermediary acting on behalf of the firm) may decide to appeal to this court at a cost $\lambda$. We assume that $\lambda$ is non-monetary, therefore, the court cannot reimburse the firm for these expenses. If a $g$ type appeals then the court ensures that the bureaucrat exerts effort $e$ to grant the firm the license, whereas a $h$ type is never granted a license even if it appeals to a court. In addition, whenever the bureaucrat has received a bribe from a good firm, the court finds enough evidence to impose

[5] It is possible to have a case where the bureaucrat knows the type but not the actual $v$ of the firm. The key result of the paper does not change, though the bribe determination process and some of the comparative statics do change.

[6] The bureaucrat colludes with the h-type to issue a license in exchange for a bribe.

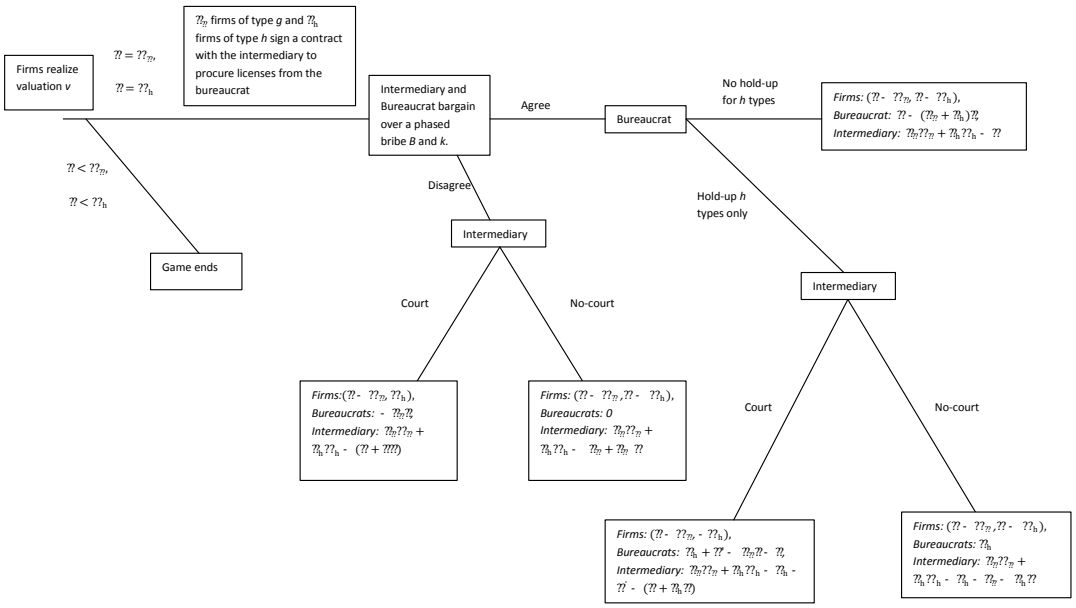


**Figure 1.**

a, possibly small, but positive penalty $f$.[7] Implicit in this framework is the assumption that a $g$ type firm that appeals to the court (after having paid a bribe) is granted immunity from any penalties for bribery. However, full immunity is not necessary for our results, and this assumption can be relaxed.

## 2.1 Corruption in the absence of intermediaries

As a benchmark, consider a model without an intermediary. The extensive form of this game is given in Figure 1.

First, consider the bribe negotiation between the firm and the bureaucrat, which we model as a Nash bargaining game. If an agreement is reached during the Nash bargaining stage, the bureaucrat receives the bribe in exchange for agreeing to exert effort $(e)$ to process the license. Thus, the Nash bargaining bribe is paid with the *quid pro quo* agreement that the firm will be granted the license at some future stage. However, this Nash bargaining solution cannot be enforced and a bureaucrat may hold-up the firm by not granting the firm

[7]Note that there is no fine if the bureaucrat has not issued the license but has not taken any bribe. This is perhaps more realistic than the case where the court always fines the bureaucrat. Given that there are different types of firms, it is possible for the bureaucrat to mistake a $g$ type as a $h$ type and deny a license.

the license despite having accepted the bribe.[8]

Within the framework specified above, if a bureaucrat holds up a firm, a $g$ type firm will always choose to go to court. Since going to court results in a fine $f$, a bureaucrat will never hold-up a $g$ type firm. However, $h$ type firms will never choose to go to court because appealing to the court does not produce a license. Thus, $h$ type firms will always be held-up. Let $x$ denote the bribe paid by a $g$ type in exchange for license. Then the agreement and disagreement payoffs are

| | Firm | Bureaucrat |
|---|---|---|
| agreement | $v-\gamma-x$ | $x-e$ |
| disagreement | $v-\gamma-\lambda$ | $-e$ |

Given the above payoffs the Nash bargaining solution (assuming equal bargaining powers) $x$ will be given by the solution to the maximization of the Nash product.

$$x = \arg\max_{x'}(-x' + \lambda) \cdot (x') = \frac{\lambda}{2} \tag{1}$$

Thus, conditional on choosing to apply for a license, a $g$ type firm will pay a bribe $x = \frac{\lambda}{2}$. Since $h$ type firms are always held-up, they will never pay a bribe in equilibrium, $b = 0$.[9]

Given this bribe game, we now turn to the entrepreneur's decision to apply for a license (and enter the market). Note that a $g$ type firm can credibly threaten to take the bureaucrat to court only if $v > \lambda$. Further, the cost to a $g$ type firm that chooses to apply for a license is $\gamma + \lambda/2$, therefore, a $g$ type firm with $v > \lambda$ will choose to apply for a license only if $v > \gamma + \lambda/2$.

Under the assumption of sequential rationality, we solve for the sub-game perfect Nash equilibrium of the above game using backward induction. It is clear that, for any $g$ type with $v \geq \max\{\lambda, \gamma + \lambda/2\}$ making the extortion payment ($x = \frac{\lambda}{2}$), going to court if held-up, and the bureaucrat granting the license constitute an equilibrium**.** Further, it can be verified that this equilibrium satisfies backward induction.

We now turn to firms with $v < \lambda$. In this case, a firm will never approach the court and

[8]The bureaucrat saves $e > 0$ by holding up. There can be several other reasons why hold-up might be profitable but we do not consider these and focus more on the implications of such hold-ups.

[9]It should be noted that, if bribing were enforceable then the Nash bargaining solution between a bureaucrat an $h - type$ will yield a bribe of $\frac{v+e}{2}$.

consequently will always be held up by the bureaucrat. Irrespective of the outcome of Nash bargaining, the bureaucrat has no incentive to incur positive cost and issue the license. Since $v$ is observable to the bureaucrat, any firm with $v < \lambda$ will not apply. We characterize this simple equilibrium in the following lemma.

**Lemma 1** *A $g$ type firm applies for a license if and only if $v \geq \max\{\lambda, \gamma + \lambda/2\}$ and $h$ type firms do not enter the market due to hold up.*

**Remark 2** *If the navigation costs are small relative to the litigation costs (i.e. $\gamma < \lambda/2$), then the entry decision to apply for a license is only affected by the litigation costs $\lambda$, and reducing the navigation cost $\gamma$ will not change the number of firms.*

Navigation costs in our model may be interpreted as red tape, and it is often suggested that lowering red tape can reduce bribery and increase efficiency. Remark 2, however, suggests an interesting finding regarding the effectiveness of this policy. If the navigation costs are low relative to litigation costs $\lambda$, then lowering these navigation costs will not increase efficiency by increasing the number of good firms that enter the market.

# 3 Corruption with monopolistic intermediaries

We now consider the role of a monopolistic intermediary ($M$) who can reduce the navigation cost $\gamma$. Due to its familiarity with the system, the intermediary's cost of navigating the bureaucracy to obtain a license is 0. A firm of type $i = \{g, h\}$ and an intermediary sign a contract where the firm pays $m_i$ to the intermediary in order to navigate the application process (i.e. lower navigation costs to $\gamma = 0$) and procure the license. This reflects Bray's (2005) assertion that,

> [b]y employing a local agent or a representative, companies can cut down the time needed to get to know new markets and thus reduce the costs of operating there. Intermediaries may also act as a buffer against demands for bribes: they can make their decisions whether or not to pay, according to local custom.

We denote the actual number of applicant firms of type $i$ by $k_i$, where $k_i \leq n_i$. If the intermediary succeeds in obtaining the license the game ends. However, if the bureaucrat

holds-up the intermediary and does not grant the license, the intermediary incurs a reputation cost of $D > 0$ unless the intermediary appeals to the court at cost $T$. These reputation costs may reflect lost business from future referrals from this firm. The cost is avoided if the intermediary goes to court perhaps because it will be perceived as having made an honest effort to procure the license if it goes to court.[10] Thus, there two aspects to appeals. The first occurs when an appeal is made by the intermediary (against the bureaucrat) for not issuing a license. In this case, the court examines the appeal and bureaucrat is required to grant licenses to the $g$ type firms, while $h$ type firms are not granted the license. The second aspect to the appeal arises when, irrespective of the type of firm, an intermediary approaches the court to avoid incurring costs $D$. Note that because the intermediary provides both types of firms with a legitimate service (reducing navigation costs), the court cannot penalize it for contracting with the $h$ types.[11]

The intermediary's court costs take a specific form in that it depends on the number of its client firms. Specifically, there is a fixed cost $F$ that is incurred only once, and a variable cost $Z$ for each appeal that the intermediary chooses to make. That is, suppose the intermediary has not gone to court for any of the $1, 2, ...n-1$ license applications, then the total cost of going to court for the $n^{th}$ firm is $T = F + Z$. On the other hand if the intermediary went to court for any of the $n^{/} < n$ applications, then the cost of going to court for each $n > n^{/}$ is $T = Z$.Obviously, these costs are related to the firm's litigation costs $\lambda$. It is reasonable to assume that $F + Z > \lambda > Z$.

The logic behind this cost function is similar to that found in Gintis' (2009) analysis of a firm's choice between hiring a lawyer only if it is accused of wrongdoing, and keeping a lawyer on "retainer" permanently. By maintaining a lawyer on retainer a firm incurs only the marginal cost and not the fixed cost for its legal defense, whereas by hiring a lawyer only after it has been accused it must incur both the fixed and the marginal cost of legal fees. In our model, the intermediary's fixed cost may be interpreted as the costs of hiring a lawyer on retainer. Once these costs have been sunk, it incurs only the marginal cost for

[10] Alternatively, the intermediary and firm may include a damage clause in their contract. The clause may state that: "the intermediary shall pay the firm $D$ in the event it fails to make sufficient effort in procuring the license."

[11] It may appear inconsistent that the intermediary is not penalized by the court for attempting to obtain a license for the $h$ types. However, we assume that the intermediary's knowledge of the firm's type is soft (not third-party verifiable), therefore, it cannot be responsible for agreeing to lower the navigation costs of either type of firm.

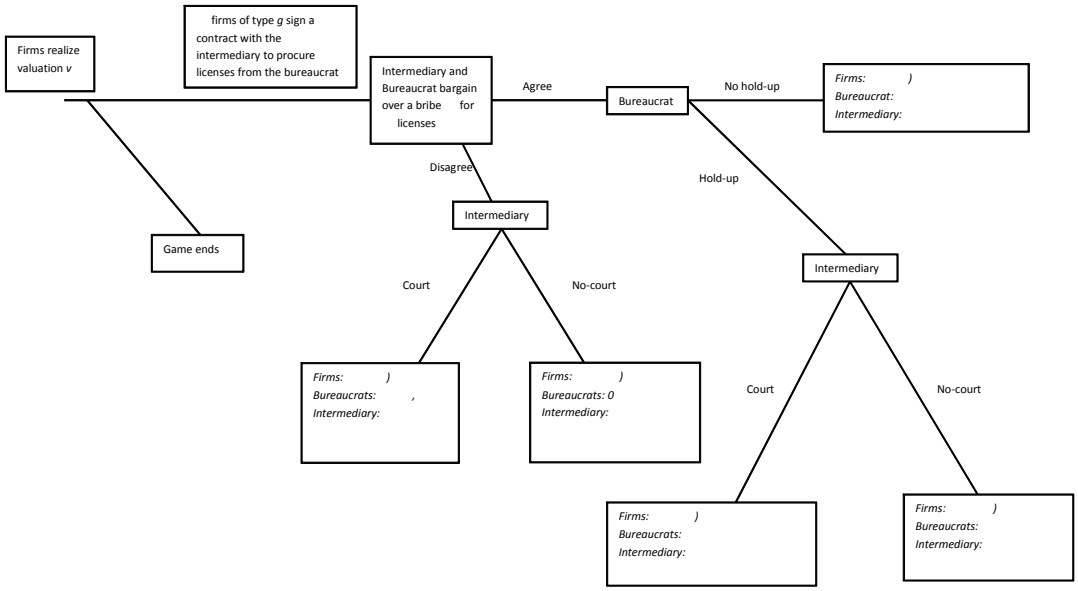


**Figure 2.**

each appeal.[12]

## 3.1 A market with $g$ types

To understand how the presence of the intermediary affects the market, we begin by studying the equilibrium with only $g$ types. In contrast to the game without an intermediary where each firm negotiates independently with the bureaucrat, here the intermediary and the bureaucrat negotiate over an aggregate bribe $B_g$ that is paid in exchange for the licenses of all the firms that the intermediary represents. We assume that this bribe is determined through Nash bargaining between the intermediary and the bureaucrat. The time-line of the game is outlined below and characterized in the extensive form game (see Figure 2).

1. In period 0 firms realize their value for the licence $v$. The intermediary chooses fees $m_g$.

2. Given their valuation $v$ and the fees $m_g$, $k_g$ number of $g$ type firms sign a contract with the intermediary to help lower negotiation costs and deliver the licenses.

[12] A similar cost structure is also found in Konrad and Skaaperdas (1997)

3. The intermediary and the bureaucrat negotiate (through Nash bargaining) over an aggregate bribe $B_g$ in exchange for $k_g$ number of licenses to be granted. In the absence of any agreement, the bureaucrat chooses whether to issue any license. If any of the $k_g$ licenses are not issued, the intermediary can appeal the bureaucrat's decision in court, where the cost of going to court is $T$ (described above). Since the firm is a $g$ type, the court instructs the bureaucrat to issue the license.

4. In the event of an agreement, bribe $B_g$ is paid and the $k_g$ licenses are granted if the bureaucrat chooses not to hold-up the intermediary. If the bureaucrat holds-up and issues $l < k_g$ licenses, the intermediary must decide whether to go to court or not. If the intermediary chooses not go to court, it will incur a cost of $D$ from $k_g - l$ firms for failing to procure the licenses on their behalf. If the intermediary appeals to the court, the bureaucrat is forced to process the licenses and is penalized $f$ for having accepted a bribe. Conditional on going to court, the intermediary always avoids incurring the reputation costs of $D(k_g - l)$.[13]

It is clear that in any equilibrium (satisfying subgame perfection) the bureaucrat never holds up the intermediary and will always deliver the license ($l = k_g$) if it expects the intermediary to approach the court. Thus, assuming that $D$ sufficiently large, which we specify more precisely below, the intermediary will always approach the court if a license is not delivered. Thus, there is no hold-up in this equilibrium with $g$ types.

Turning to the Nash bargaining game, the disagreement payoffs $O_B, O_M$ for the bureaucrat and the intermediary are given by

$$O_B = -k_g e \tag{2}$$

$$O_M = -(F + k_g Z). \tag{3}$$

In the disagreement game, the intermediary approaches the court to seek licenses for $k_g$ firms resulting in the payoff $-(F + k_g Z)$. The bureaucrat's disagreement payoff reflects the fact that it will be asked to issue $k_g$ licenses. Assuming that the intermediary seeks licenses for

[13] This cost captures lost business from other potential clients due to negative "referrals" from these firms. Thus, the reputation cost here is different from the standard definition of "reputation" within the context of repeated games (as discussed in Mailath and Samuelson 2006).

$k_g$ firms, the bribe $B_g$ will be given by the solution to the following maximization of the Nash product.

$$B_g = \arg\max(-B - (-F - k_g Z)) \cdot (B - k_g e + k_g e) = \frac{F + k_g Z}{2} \tag{4}$$

Comparing this case with the model without intermediaries (eq 1), it is easy to see that the presence of an intermediary affects the firm's costs in two ways. First, as discussed earlier it reduces the navigation cost from $\gamma$ to 0. Second, if $\lambda > Z + F/k_g$, each firm's extortion payment (now paid through the intermediary) is also reduced. Thus, assuming that the intermediary does not expropriate the entire surplus, a firm's payoff will be higher in the presence of an intermediary.[14]

From the preceding discussion, it is clear that the benefit to the firm from intermediation depends on the total surplus generated by the intermediary and the exact division of this surplus.[15] As noted, this surplus depends on the size of the navigation cost $\gamma$ and the difference in legal costs ($F + Z - (Z + F/k_g) > 0$), which depends on the number of firms ($k_g$). The number of firms, in turn, depends on the fees that the intermediary charges. Since we assume that the intermediary is a profit maximizing monopolist, it chooses a fee that maximizes its profits, given the above bribe. Firms take the fee as given and make their entry decisions accordingly.

*Assumption 1: The intermediary chooses the fee $m$, but the firm can always exercise its outside option and apply for the license on its own.*

*Assumption 2: The intermediary knows the distribution of $v$, but an individual firm's $v$ is private information, and that $n_g \cdot (\frac{\overline{v}-m}{\Delta v}) \geq 1$ at $m = \gamma + \frac{\lambda}{2}$, where $\Delta v = \overline{v} - \underline{v}$. That is, $\overline{v}$ is large enough so that even in the absence of an intermediary, at least one $g$ type firm wants to enter the market.*

**Proposition 3** *Suppose all potential entrants are $g$ types. Under Assumptions 1 - 2, with sufficient number of potential firms (that is, there exists $\overline{n}_g$ such that if $n_g \geq \overline{n}_g$) interme-*

[14] Note that even if the extortion payment is not reduced, the firm may still use an intermediariy because the reduced navigation costs may offset a potentially higher extortion payment. Specifically, if $\lambda \geq Z + F/k_g - 2\gamma$ the firm will prefer to have a middlemen.

[15] Hence,a monopolistic (as opposed to more competitive) market structure for intermediation is likely to underestimate the gain to the good firms.

*diation is profitable and the intermediary will set its fees,*

$$m_g^* = \min\{\frac{\overline{v}}{2} + \frac{Z}{4}, \gamma + \frac{\lambda}{2}\}.$$

*In this case the number of g type firms entering the market will not be lower compared to the case without intermediation.*

**Proof.** Assumption 1 requires that the following incentive compatibility constraint be satisfied,

$$\gamma + \frac{\lambda}{2} \geq m_g.$$

Hence to set the fees, the intermediary solves the following maximization problem.

$$Max \quad k_g(m_g) \cdot m_g - \frac{F + k_g(m_g)Z}{2}, \quad \text{subject to } \gamma + \frac{\lambda}{2} \geq m_g.$$

Using Assumption 2 we note that the expected number of firms that will enter the market for a given $m$ is,

$$k_g(m) = n_g \cdot (\frac{\overline{v} - m_g}{\Delta v}), \text{ where } \Delta v = \overline{v} - \underline{v}. \tag{5}$$

Combining the previous two equations, the intermediary's profit function is,

$$n_g \cdot (\frac{\overline{v} - m_g}{\Delta v})[m_g - \frac{Z}{2}] - \frac{F}{2}. \tag{6}$$

It can be shown that the solution to the first order condition is,

$$m_g^* = \frac{\overline{v}}{2} + \frac{Z}{4} \tag{7}$$

Note that the intermediary's profit is strictly increasing in $m$ at $m = 0$. Thus, either the profits are increasing in $m$ for all $m \in [0, \gamma + \frac{\lambda}{2}]$, in which case the solution is $m_g^* = \gamma + \frac{\lambda}{2}$, or the solution is an interior solution given by $m_g^* = \frac{\overline{v}}{2} + \frac{Z}{4}$. However, this solution does not guarantee that the intermediary's profits are positive. Specifically, if the fixed costs $F$ are large, then the intermediary's profits may be negative when the number of firms is small.

We now show that under Assumptions 1 - 2, there always exists an $\overline{n}_g$ such that for all $n_g \geq \overline{n}_g$ the intermediary can make a positive profit. First, consider the case where $\frac{\overline{v}}{2} + \frac{Z}{4} \leq \gamma + \frac{\lambda}{2}$, so that the optimal $m = \frac{\overline{v}}{2} + \frac{Z}{4}$. Since $\lambda > Z$, Assumption 2 implies $\frac{\overline{v}}{2} + \frac{Z}{4} < \overline{v}$. A straightforward calculation shows that $m_g > \frac{Z}{2}$, or that the first term in the intermediaries profit function (6) is strictly positive. Thus, if

$$n_g > \frac{\frac{F}{2}}{(\frac{\overline{v}-m}{\Delta v})[m - \frac{Z}{2}]} = \overline{n}_g \tag{8}$$

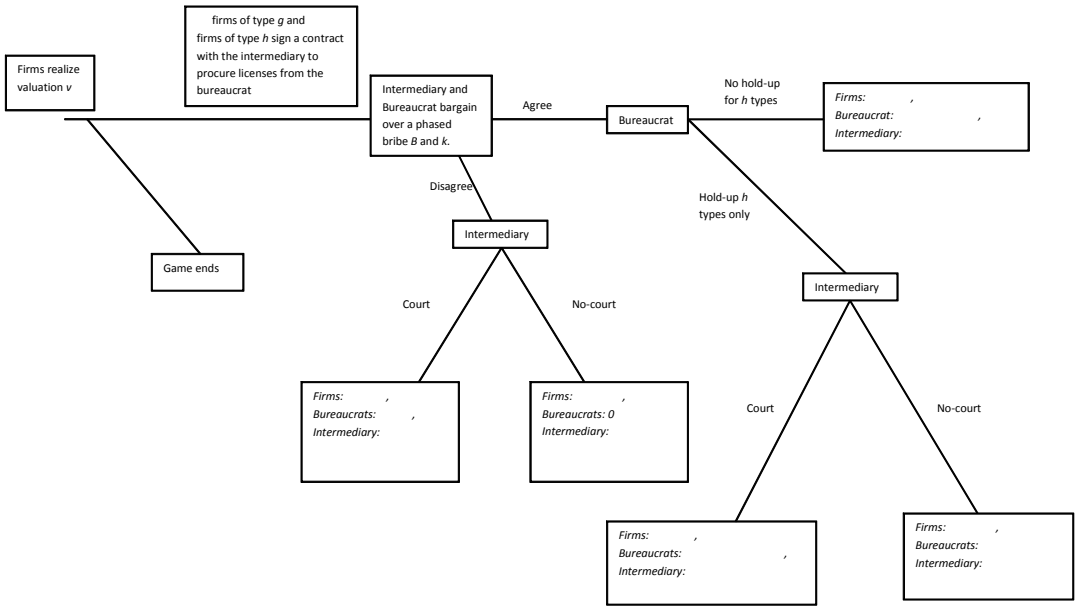


**Figure 3.**

the profit to the intermediary is positive. Second, consider the case where $\frac{\overline{v}}{2} + \frac{Z}{4} > \gamma + \frac{\lambda}{2}$, so that the intermediary charges $m_g^* = \gamma + \frac{\lambda}{2}$. In this case, it is easy to see that the first term in the intermediary's profit (6) is strictly positive. Following similar arguments, it can be shown that there exists an $\overline{n}_g$ such that for all $n_g \geq \overline{n}_g$ the intermediary can make a positive profit.

To show that the number of firms will not be lower, recognize that the intermediary chooses $m$ such that $\gamma + \frac{\lambda}{2} \geq m$. Thus, at least as many (or more firms) will enter the market with an intermediary than without. ■

## 3.2 Market with $g$ types and $h$ types

We now turn to a market with both $g$ types and $h$ types. Recall that in the absence of intermediaries only the $g$ types apply for a license, while the $h$ types abstain from entering the market because of hold-up. We now show that in the presence of an intermediary $h$ types may be able to avoid the hold-up problem and enter the market. Consider the following time line that informally characterizes the extensive form game with both types. The corresponding extensive form of this game is found in figure 3.

1. In period 0 firms realize their their value for the licence $v$, drawn from the distribution $\theta$. The intermediary chooses fees $m_g$ and $m_h$.

2. Given their valuation $v$ and fees $m_g$ and $m_h$, $k_g$ firms of type $g$ and $k_h$ firms of type $h$ sign a contract with the intermediary.

3. The intermediary and the bureaucrat negotiate over the total bribe $B$ and the total number of licenses $k = k_h + k_g$ to be awarded. They also agree whether to implement the agreed contract in a *single stage* or in a *phased* manner. In a single stage contract the bribe $B$ is made in one payment, where as in a phased contract part of the bribe $B_h$ is paid for the $k_h$ licenses of the $h$ types, and another bribe amount is paid later for the delivery of the licenses for the $g$ types. If there is no agreement, the intermediary chooses whether to make any license application on behalf of the firms and whether to approach the court.[16]

4. If the bureaucrat does not hold-up, $k$ licenses are granted.

5. If the bureaucrat chooses to hold-up it issues $l < k$ licenses. The intermediary must then decide whether to go to court to avoid the costs $D$ as a result of firms that have been denied licenses. For the $g$ types it can go to the court with an appeal for the license to be granted. In this case the license is issued and the bureaucrat is fined $f$ if a positive bribe was exchanged. Conditional on going to court, the intermediary always avoids paying the $D$.

6. If the bureaucrat and the intermediary agreed to a phased contract in stage 3, they can renegotiate the contract for the remaining phase(s) following hold-up by the bureaucrat.

Having solved the game with only $g$ types in the previous section, we focus our analysis on the $h$ types. Recall that for the $h$ types, the intermediary cannot force the bureaucrat to grant it the licenses, but it can approach the court to avoid having to incur costs $D$. As in the case with $g$ types only, we first study the negotiation between the bureaucrat and the intermediary using the concept of Nash Bargaining solution.

Let $k_h, k_g$ be the number of $h$ types and $g$ types who have paid the required fees $(m_h, m_g)$ to engage the services of the intermediary. If the bureaucrat and the intermediary fail to agree, the disagreement payoffs will be given by

[16]Note that in the two-stage contract the intermediary pays the bribe before the bureaucrat issues the licenses for the $h$ types, therefore, the intermediary cannot hold-up the bureaucrat.

$$O_B = -k_g e \tag{9}$$

$$O_M = -(F + kZ) \tag{10}$$

In the disagreement game, the intermediary approaches the court to seek licenses for $k_g$ firms resulting in the payoff $-(F + k_g Z)$. For the $h$ types, it will approach the court to avoid the reputational costs $D$, leading to a payoff of $-k_h Z$. The bureaucrat's disagreement payoff reflects the fact that it will be asked to issue $k_g$ licenses. Assuming that $M$ seeks licenses for $k$ firms, the bribe $B$ will be given by the solution to the maximization of the Nash product,

$$B = \arg\max\{[-B^{/} - (-F - kZ)] \cdot [B^{/} - ke + k_g e]\} = \frac{F + kZ + k_h e}{2}. \tag{11}$$

**Proposition 4** *Suppose $F > 2e$, $n_g$ sufficiently large, and Assumptions 1-2 are satisfied. There exists a two-phased contract where the intermediary pays $B_h$ to receive $k_h$ licenses for the $h$ types, followed by $B_g$ to receive $k_g$ licenses. In this case both types of firms enter the market, and hold-up does not occur. The intermediary charges different fees to the two types: $m_g^* = \frac{\overline{v}}{2} + \frac{Z}{4}$, $m_h^* = \frac{\overline{v}}{2} + \frac{(Z+e)}{4}$.*

**Proof.** The details for this proof are provided in the Appendix, however, we provide the basic intuition below. First, the intermediary pays a certain portion of the total bribe ($B$) and receives a (mutuall agreeable) corresponding number of licenses. Once these licenses are delivered, the intermediary pays the rest of the bribe to receive the other licenses. Since for the $g$ types, hold-up is not an issue (as seen in the previous section), it is natural that the intermediary would like to get licenses for the $h$ types first. If the bureaucrat holds up any $h$-type's license, the intermediary goes to the court to avoid $D$ and renegotiates the extortion payment for the $g$ types. Since renegotiated bribe goes down by $F/2$, the bureaucrat will not hold-up as long as the gains from holding up ($e$) are small compared to $F/2$. It is important that at least one $g$ types follows the $h - types$, otherwise the intermediary will be left with no leverage.[17]

[17] Although we focus only on a two stage bribe, several multi-stage contracts are feasible. Indeed, the aggregate bribe $B$ (as in 11) can be partitioned into several payments made at each stage. However, regardless of the number of stages, the total bribe (in the absence of hold-up) must be equal to $B$. If hold-up were to occur at some stage, the renegotiated bribe will always be always be reduced by $F/2$, regardless of the number of stages.

The determination of fees is identical to the previous case of only $g-types$. The intermediary can treat this as two separate problems subject to the constraint that $k_g > 1$. For large values of $n_g$, it is clear that $m_g^* = \frac{\overline{v}}{2} + \frac{Z}{4}$. Similar calculations for the $h$ types (see appendix) shows that $m_h^* = \frac{\overline{v}}{2} + \frac{(Z+e)}{4}$. The condition $F > 2e$ guarantees that the number of $h$ types seeking license will be positive. ■

Similar to the analysis in Section 3.1, we study the intermediary's profit function. First, note that we must have $\overline{v} > m_h^*$,otherwise none of the $h$ types would apply for a license. Thus, it can be shown that the intermediary's profit is,

$$\{n_g \cdot (\frac{\overline{v} - m_g^*}{\Delta v})(m_g^* - \frac{Z}{2})\} + \{n_h \cdot (\frac{\overline{v} - m_h^*}{\Delta v})(m_h^* - \frac{Z+e}{2})\} - \frac{F}{2}, \tag{12}$$

which is strictly positive only if,

$$n_g \geq \frac{\frac{F}{2} - \{n_h \cdot (\frac{\overline{v}-m_h^*}{\Delta v})(m_h^* - \frac{Z+e}{2})\}}{(\frac{\overline{v}-m_g^*}{\Delta v})(m_g^* - \frac{Z}{2})} = \overline{\overline{n}}_g. \tag{13}$$

We study inequality (13) to understand the implications of the previous proposition. Observe that (13) is weaker than the profitability condition (8) for $\overline{n}_g$ derived in proposition 3; that is, $\overline{\overline{n}}_g < \overline{n}_g$. When $n_g \geq \overline{n}_g$ the intermediary receives the same profits from $g$ types because $m_g$ is the same regardless of whether both types of firms are present or absent, and a strictly positive profit from $h$ types. When $n_g \in (\overline{\overline{n}}_g, \overline{n}_g)$, then the intermediary is able to receive a positive profit from $g$ types, when previously it would not have offered its services to good firms. Thus, in this case it receives positive profits from $g$ types, in addition to the profit it receives from $h$ types. Consequently, its profits are always strictly higher in the presence of both types of firms, which implies that whenever the potential number of good firms ($n_g$) is sufficiently large ($> \overline{\overline{n}}_g$), it will also want to offer its services to $h$ types. Second, this result implies that are values of $n_g \in (\overline{\overline{n}}_g, \overline{n}_g)$, where intermediaries would be absent in the presence of only $g$ type firms, but where they are present if there are both $g$ and $h$ type firms. Thus, interestingly, when $n_g \in (\overline{\overline{n}}_g, \overline{n}_g)$, the presence of $h$ types increases the number of $g$ types that enter the market. The following corollary summarizes these results.

**Corollary 5** *The presence of h type firms increases the range over which intermediaries are willing to provide services for g type firms. Further, the intermediary's profit is always higher from serving both types of firms.*

Intuitively, in the absence of $h$ types the intermediary offers its services to $g$ types only when there are sufficiently many potential $g$ types (i.e. $n_g$ sufficiently large) so that profits are

positive. However, when both types of firms are present, the intermediary cross-subsidizes the profits obtained from providing its services to $h$ types, in order to provide its services to $g$ types even when there are relatively few $g$ types present. Indeed, it is worth noting that $\overline{\overline{n}}_g$ is decreasing in $n_h$. Thus, an increase in the number of $h$ type firms will reduce the minimum number of $g$ types needed for the intermediary to be profitable.

Proposition 4 and Corollary 5 suggest that the intermediary will offer its services to both types (and prevent hold-up among $h$ types) when there are sufficiently many $g$ types, when navigation costs are high, and when bureaucratic effort is low relative to the fixed cost of going to court ($F > 2e$). In general, we should expect that there will be sufficiently many $g$ types, otherwise, the regulator could simply prohibit this industry entirely (instead of regulating it by granting only licenses to $g$ types). Thus, we expect the condition that there are sufficiently many $g$ types to hold in most cases. Furthermore, it is not surprising that the existence of high navigation costs will encourage the entry of intermediaries. What is more interesting here is that bribery is more likely to occur when the cost of bureaucrat effort is low. This suggests that when the bureaucrat's tasks are relatively easy to perform but court costs are high, then intermediaries will be able to prevent hold-up and enable $h$ types to enter the market.

These results appear to be consistent with the empirical findings of Bertrand et. al.'s (2007) study of drivers licenses in India. They find that intermediaries help qualified ($g$ type) drivers and unqualified drivers ($h$ type) drivers navigate the application process and receive licenses. It is likely the case that there are probably a large number of individuals who need licenses, thus, $n_g$ and $n_h$ are likely to be large.[18] Further, bureaucratic tasks in providing licenses appear to be relatively easy. However, the navigation costs were estimated by individuals to be quite large since on average individuals estimated that they would need to make 6 visits and interact with multiple bureaucrats in order to receive a licenses. Our model suggests that in precisely these situations, intermediaries that serve both types are likely thrive.

Lambsdorff (2011), discussing the findings of Bray (2005), points out that intermediaries are used for bribery most frequently in the retail sector and less frequently in oil, gas, and mining. Presumably, the retail sector has a large number of firms, and further bureaucratic effort is likely to be small. In this context, our model predicts that we should expect to see

[18] A similar pattern is observed in the developmental sector where middlemen operate to help both qualified as well non-qualified beneficiaries of government's development schemes.

intermediaries utilized to pay bribes more frequently in the retail sector.

From a policy stand point the previous proposition suggests that while lowering court costs ($F$) may help prevent bribery, making bureaucratic costs easier (lowering $e$) may not. Further, the key finding of Proposition 4 is that intermediaries provide services to both good and bad firms and that the good and bad firms have a symbiotic relationship with each other. Thus, as Bertrand et. al. (2007) point out, bribery not only greases the wheels for the good types, but it also generates costs to society by allowing harmful agents to obtain licenses. Consequently, the overall welfare effect depends on whether their positive impact on good firms offsets their negative impact from introducing harmful firms. We study these issues in the following section.

# 4 Welfare

In the absence of intermediaries, hold-up is a "blessing-in-disguise" because it prevents corruption and entry of the $h$ type firms.[19] The previous sections have shown how intermediation can, under certain conditions, solve the hold-up problem and encourage corruption. In this section we study the welfare implications of intermediaries.

Assume that $\underline{v} > e$ and that the harm $h$ from the $h$ types is greater than $\overline{v}$. These two conditions ensure that in the first best world the regulator will want to grant licenses to all $g$ types and to none of the $h$ types.Furthermore, with only $g$ types, the number of firms entering the market will always be greater with an intermediary than without. Thus, presence of intermediaries is always welfare enhancing with only $g$ types (see Proposition 3).[20] The more interesting case is when there are both $g$ and $h$ types. Since the presence of $h$ types increase the range over which intermediaries provide services for $g$ types, it suggests that the welfare gain from $g$ types will be realized for even smaller values of $n_g$. However, since the intermediary facilitates the entry of $h$ types, the overall welfare implications of intermediaries will be ambiguous when there are both types of firms.

Formally, with both types of firms, the social welfare (SW) in the presence of an inter-

[19] This is in sharp contrast to the hold-up problems in the context of legal contracts where, hold-up possibilities can lead to under-investment.

[20] **We assume that when** $m_g = \gamma + \frac{\lambda}{2}$, firms bribe the bureaucrat directly.

mediary is given by

$$SW = n_g \int_{m_g^*}^{\overline{v}} v\ \theta(v)dv + n_h \int_{m_h^*}^{\overline{v}} (v-h)\ \theta(v)dv.$$

Under Assumptions 1 - 2, this above expression simplifies to

$$\frac{n_g}{2\Delta v}((\overline{v})^2 - (m_g^*)^2) + \frac{n_h}{2\Delta v}((\overline{v})^2 - (m_h^*)^2) - \frac{n_h h}{\Delta v}(\overline{v} - m_h^*). \tag{14}$$

Since $h > \overline{v} > m_h^* > m_g^*$, the above expression may be positive or negative.

In the absence of an intermediary, the social welfare is

$$n_g \int_{\gamma+\frac{\lambda}{2}}^{\overline{v}} v\ \theta(v)dv,$$

which simplifies to

$$\frac{n_g}{2\Delta v}((\overline{v})^2 - (\gamma + \frac{\lambda}{2})^2). \tag{15}$$

Combining these expressions, it follows that if

$$n_g[(\gamma + \frac{\lambda}{2})^2 - (m_g^*)^2] > n_h(\overline{v} - m_h^*)[2h - (\overline{v} + m_h^*)], \tag{16}$$

then intermediaries will be welfare enhancing.

Note that when the solution to $m_g^*$ is interior, then the left hand side of (16) is strictly positive. Thus, the previous inequality will hold for some parameter values and eliminating intermediaries may result in welfare losses to society.[21] Hence, in this case it will not be optimal to eliminate intermediaries, even though this reduces corruption.

It must be noted that when $\overline{v}$ is large, $\frac{\overline{v}}{2} + \frac{Z}{4}$ will be large and the incentive compatibility constraint is binding (so that $m_g^* = \gamma + \frac{\lambda}{2}$ ). In this case, the benefit to the $g$ types vanishes or becomes negligible. But we must be careful about doing such comparative statics because without any $g$ types the equilibrium with both types may not exist. Second, as $\overline{v}$ increases it will most likely be greater than the harm $h$, violating our condition that for all $h$ types $\overline{v} < h$.

We now study the comparative statics of 16.

[21] In the case of the following example, welfare is improved with an intermediary. $\overline{v} = 3, \underline{v} = 1, Z = .5, e = .2, \gamma = 2, \lambda = 1, h = 3, F = 4, n_g = n_h = 5$. The net gain in social welfare with an intermediary is, 1.85, the intermediary's profit is 7.11, the expected number of $g$ types who enter the market 3.4, and $h$ types 2.2. All other constraints can also be shown to be satisfied.

**Proposition 6** *Suppose that the number of good firms is large. There exists a* $\overline{\gamma} \geq 0$, *such that for all* $\gamma > \overline{\gamma}$, *the presence of an intermediary improves welfare. Furthermore, the (welfare) gains from an intermediary are increasing in* $e$, $\gamma$, *and* $\lambda$.

**Proof.** We need $n_g$ to be large so that (16) is satisfied. The left hand side of (16) is increasing in $\gamma$. Thus, for some sufficiently large $\gamma$ the presence of an intermediary will raise welfare (relative to the case without an intermediary). Substituting the (interior solutions) for $m_h^*$ and $m_g^*$, into this expression and taking the derivative yields the above results. ■

This proposition suggests that the welfare from allowing intermediaries to function is larger when the navigation costs $\gamma$ are large because intermediaries eliminate these navigation costs. Interestingly, this is despite the fact that intermediaries lower the navigation costs for both good and harmful types. Further, the welfare gain from an intermediary is increasing in the individual firm's court costs ($\lambda$) because firms are able to "outsource" their legal expenses to an intermediary and exploit the intermediary's economies of scale. Taken together, this suggests that governments may want to permit intermediaries in situations where navigation costs and court costs are large, but prohibit or limit them when these conditions do not hold

Oldenburg (1987) describes the role of intermediaries in facilitating bribe payments for a land grant and consolidation program in India. Since the majority of farmers were eligible for this program, presumably $n_g$ was relatively large. However, he notes that the government took much care in minimizing the red-tape or navigation costs for farmers applying for this program. Thus, consistent with Oldenburg's intuition, our model suggests that in this case intermediaries would not be welfare improving. [22]

Further, our model suggests that contracts in industries with significant red-tape, intermediaries will be useful as long as there are sufficiently many legitimate firms. In contrast, if there are few legitimate firms, intermediaries will only enable the entry of harmful firms into the industry. Industries such as real estate development and construction are known to have multiple layers of red-tape (K & L Gates 2014). Our model suggests that in these industries, intermediaries will improve welfare if the majority of these projects are from legitimate firms. In contrast, in the case of granting driver's licenses discussed in Bertrand et. al. (2007), their data suggests that are a significant number of $h$ types. Consequently, intermediation would generate welfare losses rather than gains even though they lowered the

[22] Nevertheless, as Oldenberg notes, intermediaries foiled this by making farmers believe that the navigation costs were much higher than they were in order to create a market for their services.

navigation costs of $g$ types.

Finally, observe that an increase in $e$ (the bureaucrat's cost of effort) also raises the welfare gains from an intermediary. This occurs because an increase in $e$ increases the fee that the intermediary charges the $h$ types but does not affect the fee that it charges the $g$ types. Thus, an increase in $e$ reduces the participation of $h$ types while not affecting the participation of $g$ types, therefore, a higher $e$ increases the welfare gains from an intermediary.

# 5 Conclusion

Intermediaries are frequently employed by firms in order to facilitate corrupt transactions. Interestingly, the U.S. Foreign Corrupt Practices Act (FCPA) explicitly recognizes this issue by stating that the act "imposes civil and criminal penalties for any U.S. person or corporation [making] a corrupt payment to any foreign government official, directly or indirectly to obtain or retain business" (O' Melveny 2009)". Data collected by the authors from the U.S. Department of Justice from cases between 1998 and 2007 show that intermediaries were employed in slightly over 40% of all corrupt transactions (among instances of corruption where the D.O.J. brought charges).[23] Thus, given this high frequency, many governments are considering whether to prohibit intermediaries entirely.

In light of the relevance of this issue, this paper studies the role of intermediaries in facilitating corrupt transactions. Although the previous literature has studied the role of intermediaries in enabling corruption, none of these papers have examined the mechanism through which intermediaries prevent hold-up. Our analysis of intermediation and hold-up highlights the mixture of both legal and illegal services that the intermediary offers, and shows that it may be difficult to separate these two aspects.

Specifically, we show that in the absence of intermediaries only good firms enter the market, and harmful firms are dissuaded from entering the market because bureaucrats can hold-up their license applications. In the presence of intermediaries who lower navigation costs, the number of good firms increase. Thus, if only good firms are present, and the potential number of good firms is sufficiently large so that intermediaries can profit from them, then intermediaries unambiguously improve social welfare.

[23] All details are available from: http://www.justice.gov/criminal/fraud/fcpa/cases/a.html

When both good and bad firms are present, we show that intermediaries can employ the legal elements of their business (i.e. services to good firms) in order to prevent hold-up from occurring to harmful firms. Intermediaries always receive a higher profit from serving both types of firms and, therefore, procure licenses for both good and harmful firms. Thus, the possibility of hold-up no longer prevents harmful firms from entering the market. Hence, the legal arm of the middleman is pre-requisite for the illegal arm to function. Interestingly however, because intermediaries profit from both types of firms, the existence of harmful firms has a positive impact on the participation of good firms by making intermediation on behalf of good firms viable for a larger range of parameter values. Thus, in contrast to models of adverse selection where the bad drives out the good, in our model good and bad firms complement each other through an intermediary. Specifically, the presence of harmful firms raises the profitability of intermediation and makes it viable, enabling more good firms to enter the market, and good firms in turn make it possible for harmful firms to avoid hold-up, thereby encouraging more harmful firms to enter the market.

With regard to the welfare effects, we find that since more good and harmful types enter the market in the presence of an intermediary, the welfare costs of intermediaries are ambiguous in general. Specifically, we show that as long as the navigation costs are sufficiently large, and there are sufficiently many $g$ types, intermediaries will enhance welfare because the gains to the good firms can offset the costs from the harmful firms. Thus eliminating intermediaries may not be beneficial. This finding resonates with Lambsdorff (2011) who argues that in most cases prohibiting intermediaries is not good policy because,

> "complete prohibition of intermediaries hinders firms from reaping the gains that intermediaries might contribute. For example, if honest firms and "good" intermediaries are impeded by prohibition, public procurement may suffer from reduced competition, which is likely to reduce welfare."

Although our model considers a market with many firms, it can be interpreted more broadly as a single firm with several license applications, some of which are legal and others illegal. For example, a real estate developer may apply for several building permits, some of which may be legal, while others illegal. Our model shows that these legal services can be used as leverage against the bureaucrat in order to prevent hold-up among the illegal applications. In fact, our analysis can be applied in several other contexts such as the delivery of developmental goods and services, and the implementation of public programmes. In all these contexts, intermediaries serve both as informational navigator and bribe facilitator.

Our analysis shows that eliminating intermediaries is not the most efficient way to reduce corruption.

We conclude by discussing a few implications and extensions to our model. First, in our model context, average bribe paid through an intermediary will be higher than those paid without an intermediary. This result arises directly from the fact that intermediaries pay bribes on behalf of both $g$ and $h$ types. Since $h$ types have to pay higher bribes, the average bribe paid through an intermediary may be higher. Interestingly, data collected by the authors on violations of the FCPA support this finding. Specifically, we find that the average bribe paid with an intermediary is 2,749,500 (USD) for U.S. companies and 582,314 (EU) for European cases, while the average in the absence of an intermediary is $351,185(USD) and 173,583 (EU) respectively.[24] Second, our model suggests that intermediaries and bureaucrats will often make multiple bribe payments in order to avoid hold-up. Interestingly, in several of these FCPA cases the bribes are paid in more than one installment.

Third, our paper implicitly assumed that intermediaries are granted leniency from bribe giving. This is consistent with recent literature suggesting that legalizing bribe giving (for some types of bribes) can reduce corruption (Basu 2011). However, this literature has not examined whether such policies should be extended to intermediaries who pay bribes on behalf of firms. It is straight forward to extend our model include a penalty for bribe giving (for the intermediary). Suppose that there are only $g$ types so that all bribes are extortionary (or harassment bribes), which is consistent with Basu (2011) and Spagnolo (2004). Further, assume that intermediaries are not granted leniency, but are fined $f_M > 0$ when they go to court to appeal the bureaucrat's decision to not grant them the license. It can be shown that if the reputation costs are sufficiently large $D$, then there all of the results of this paper remain. However, if $D$ is small (below $F + kZ + f_M$), intermediaries will no longer want to pay a bribe (because the bureaucrat will hold-up the license since the intermediary can no longer credibly commit to go to court). In this case, firms will hire intermediaries only in order to reduce their navigation costs. However, the fees charged by intermediaries will be higher than when $f_M = 0$, therefore, fewer $g$ types may enter the market and welfare will be lower without the leniency policy. Hence, extending leniency policies to intermediaries will

[24]However, it should be noted that these descriptive statics are unconditional means. An alternative explanation may be that firms with high-value contracts use intermediaries, while those with low-value contracts bribe directly. While this is certaintly plausible, it should be noted that most of the instances of corruption in our sample involve large firms with very high value contracts. Nevertheless, given that we do not present regression results that condition on contract value, we cannot rule out this possibility.

never lower welfare.[25]

Fourth, the welfare analysis of the presence of the intermediary is robust to the consideration of alternative information structures and bribe determination process. For example, the bureaucrat may not have full knowledge of $v$, but may only know the type of the firm. In this case, the bureaucrat determines the amount of extortion payment from the $g$ types as a monopolistic firm, to maximize total profit. In such a scenario, the bribe demand $x$ from the $g$ type firms, in the absence of intermediaries, is $x = \frac{\overline{v}+e-\gamma}{2} \leq \lambda$. This is similar to the fees charged by the intermediary and in the model's context the $g$ type firms are more likely to benefit from the presence of the intermediary. Thus, the welfare gains from the presence of an intermediary will be true for a larger set of parameter values of litigations costs, navigation costs, effort and maximal value.

Finally, we have focussed on the case of a monopolistic intermediary. In many of the examples discussed in the text, there are several intermediaries and it would be interesting to see the implications of competition amongst the intermediaries. Competition is likely to lower the fees and encourage more firms of both types. Hence the broad welfare consequences are not obvious. We leave this extension for future research.

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## 6.1 Appendix: Proof of Proposition 4

**Proof.** We prove the result in three steps.

(1) First, we show that there exists a phased contract where the intermediary first pays $B_h$ for $k_h$ licenses for the $h$ types, followed by $B_g$ for $k_g$ licenses, where $B_h = (k_h Z + k_h e)/2$ and $B_g = (F + k_g Z)/2$.

Suppose the bureaucrat holds up the intermediary and issues $l < k_h$ licenses in the first phase. This will cost the intermediary a total of $(k_h - l)D$ in reputation costs. Even if there is only one $h$ type, as long as $D > Z + \frac{F}{2}$, the intermediary will choose to approach the court to avoid $D$. Note that it only incorporates half the fixed cost $(F/2)$ because the rest of this cost is recovered through the renegotiated bribe payments for the second phase. (i.e. the renegotiated bribe falls by $F/2$)We assume that $D$ satisfies this constraint so that the intermediary can commit itself to go to court. Following hold-up, the intermediary renegotiates the (second stage bribe) bribe for the remaining $k_g$ firms. This renegotiated bribe is also determined through Nash bargaining, but disagreement payoffs for the bureaucrat and

the intermediary are now $O_B = -k_g e$ and $O_M = -(k_g Z)$ respectively. Hence the renegotiated bribe is $B_g^r = k_g Z/2$.

In the second stage, upon payment of $B_g^r$ the bureaucrat will issue $k_g$ licenses. Hold-up is not profitable at this stage because the intermediary can always go to court to seek licenses for the $g$ types. Further, since a bribe has been exchanged, the bureaucrat will incur a penalty $f > 0$. Hence, hold-up is never optimal. Since the bureaucrat does not hold-up in the second stage, its expected payoff from holding up in the first stage decreases by $F/2$, but its benefit from holding up is $(k_h - l)e$. Since benefits from holding up is maximized for $l = 0$, hold up will not occur in the first stage if $F/2 \geq k_h e$, or $2k_h e \leq F$.

(2) Hold-up will not be profitable as long as $k_g \geq 1$. Recall that the equilibrium number of firms of each type depend on $n_i$ and the fee $m_i$. The fees charged must be large enough to cover the intermediary's bribe payment $B$, which is additively separable in $k_g$ and $k_h$. Thus, the fraction of the bribe $B$ ( see 11) that is allocated in the first stage towards procuring the licenses for the $h$ types will not affect the intermediary's profit maximizing choice of $m_g$, and in turn the number of $g$ types that apply for a licenses ($k_g$). Hence**,** the middleman's profit from the $h$ types will not depend on the number of $g$ types (and vice-versa) and $m_g$ will be determined exactly as in proposition 3. It can be shown that $m_g^* = \min\{\frac{\overline{v}}{2} + \frac{Z}{4}, \gamma + \frac{\lambda}{2}\}$, $k_g = n_g \cdot (\frac{\overline{v} - m_g^*}{\Delta v})$, and Assumption 2 ensures that $k_g \geq 1$. For large values of $n_g$, $m_g^* = \frac{\overline{v}}{2} + \frac{Z}{4}$.

Next, we determine the fees that will be charged by the intermediary for the $h$ types. The middleman will choose $m_h$ to solve the following maximization problem.

$$Max \quad k_h(m_h) \cdot m_h - \frac{k_h(m_h)(Z+e)}{2}, \quad \text{subject to } k_h(m_h) \leq \frac{F}{2e}.$$

Note that the constraint is the "no hold-up" constraint that ensures that the bureaucrat does not hold-up. A straightforward calculation shows that,

$$m_h^* = \frac{\overline{v}}{2} + \frac{(Z+e)}{4} \tag{17}$$

Substituting this into the constraint implies that,

$$n_h \cdot (\frac{\overline{v} - m_h^*}{\Delta v}) \leq \frac{F}{2e}. \tag{18}$$

Condition $F > 2e$ is clearly necessary to ensure that there are some $h$ types in the market.

■